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Development Document for Proposed Effluent Limitations Guidelines and Standards for Industrial Waste Combustors

DEVELOPMENT DOCUMENT
FOR
PROPOSED EFFLUENT LIMITATIONS
GUIDELINES AND STANDARDS
FOR THE
INDUSTRIAL WASTE COMBUSTOR SUBCATEGORY
OF THE
WASTE COMBUSTORS POINT SOURCE CATEGORY

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EXECUTIVE SUMMARY

EPA has proposed technology-based limits for the discharge of pollutants into navigable waters of the United States and into publicly-owned treatment works by existing and new facilities that are engaged in combustion of industrial waste from off-site facilities - the Industrial Waste Combustor Subcategory of the Waste Combustors Point Source Category. This proposed regulation establishes effluent limitations guidelines for direct dischargers based on the following treatment technologies: "best practicable control technology" (BPT), "best conventional pollutant control technology" (BCT), and "best available technology economically achievable" (BAT). New source performance standards are based on "best demonstrated technology". The proposal also establishes pretreatment standards for new and existing indirect dischargers.

EPA identified 84 facilities in the Industrial Waste Combustor Industry. The scope of the Industrial Waste Combustor Industry includes: commercially-operating hazardous waste combustor facilities regulated as "incinerators" or "boilers and industrial furnaces" under the Resource Conservation and Recovery Act (RCRA) as well as commercially-operating non-hazardous waste industrial waste combustor facilities. The proposed effluent limitations guidelines and standards are intended to cover wastewater discharges resulting from air pollution control systems, flue gas quench systems and slag quench systems associated with the operation of industrial waste combustors. Any other discharges associated with the operations of industrial waste combustors (e.g., truck washing water and boiler blowdown) are not included in the regulation. EPA has estimated that the proposed regulation will apply to 11 facilities which discharge specified IWC wastewater. Eight facilities discharge directly and three discharge indirectly to publicly-owned treatment works (POTWs).

The EPA evaluated various treatment technologies in developing the effluent limitations and standards. Table ES-1 lists the treatment technologies that are proposed for the BPT limitations and for the PSES pretreatment standards. The treatment technologies proposed for BPT are the same technologies proposed for BCT, BAT and NSPS. The treatment technologies proposed for PSES are the same treatment technologies proposed for PSNS.

Table ES-1. Technology Basis for Effluent Limitations and Pretreatment Standards

Proposed 40 CFR Subpart	Type	Technology Basis
444	BPT, BAT, BCT, and NSPS Effluent Limitations	Primary Precipitation, Solid-Liquid Separation, Secondary Precipitation, Solid-Liquid Separation, and Sand Filtration
444	PSES and PSNS Pretreatment Standards	Primary Precipitation, Solid-Liquid Separation, Secondary Precipitation and Solid-Liquid Separation

After identifying treatment technologies, the EPA calculated facility costs to upgrade facility operations to achieve the proposed limitations based on the selected technology options. Table ES-2 presents the capital and operating and maintenance costs associated with the proposed technology options. In addition to the costs for upgrading facility operations, costs were also developed for: additional land requirements, additional wastewater monitoring requirements for the proposed regulation, and RCRA permit modifications, when necessary. Overall, the proposed technology options are estimated to have a post-tax annualized cost of $1.381 million (in 1992$) for direct dischargers and $0.531 million (in 1992$) for indirect dischargers.

Table ES-2. Cost of Implementing Regulations [in Millions of 1992 dollars]

Type	Number of Facilities	Capital Costs [in 1992$]	Annual O & M Costs [in 1992$]
BPT, BAT, BCT, and NSPS Effluent Limitations	8	6.346	1.255
PSES and PSNS Pretreatment Standards	3	2.090	0.529

SECTION 1
STATUTORY REQUIREMENTS

Effluent limitations guidelines and standards for the Industrial Waste Combustor Industry were proposed under the authority of Section 301, 304, 306, 307, 308 and 501 of the Clean Water Act (CWA) (the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1251 et seq., as amended by the Clean Water Act of 1977, Pub. L. 95-217, and the Water Quality Act of 1987, Pub. L. 100-4), also referred to as "the Act".

1.1 *LEGAL AUTHORITY*

The Federal Water Pollution Control Act Amendments of 1972 established a comprehensive program to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters". (Section 101(a)). To implement the Act, EPA is required to issue effluent limitations guidelines and pretreatment standards for industrial discharges. These guidelines and standards are summarized briefly in the following sections.

1.1.1 *Best Practicable Control Technology Currently Available (BPT) (Section 304(b)(1) of the CWA)*

In the guidelines, EPA defines BPT effluent limits for conventional, priority, and non-conventional pollutants. In specifying BPT, EPA looks at a number of factors. EPA first considers the cost of achieving effluent reductions in relation to the effluent reduction benefits. The Agency next considers: 1) the age of the equipment and facilities, the processes employed and any required process changes, engineering aspects of the control technologies, non-water quality environmental impacts (including energy requirements), and such other factors as the Agency deems appropriate (CWA §304(b)(1)(B)). Traditionally, EPA establishes BPT effluent limitations based on the average of the best performances of facilities within the industry of various ages, sizes, processes or other common characteristics. Where, however, existing performance within a category or subcategory is uniformly inadequate, EPA may require higher levels of control than currently in place in an industrial category (or subcategory) if the Agency determines that the technology can be practically

applied. BPT may be transferred from a different subcategory or category.

In the initial stages of EPA CWA regulation, EPA efforts emphasized the achievement of BPT limitations for control of the "classical" pollutants (e.g., TSS, pH, BOD_5). However, nothing on the face of the statute specifically restricted BPT limitations to such pollutants. Following passage of the CWA of 1977 with its requirement for point sources to achieve best available technology limitations to control discharges of toxic pollutants, EPA shifted its focus to address the listed priority pollutants under the guidelines program. BPT guidelines continue to include limitations to address all pollutants.

1.1.2 *Best Conventional Pollutant Control Technology (BCT) (Section 304(a)(4) of the CWA)*

The 1977 Amendments added Section 301 (b)(2)(E) to the Act establishing BCT for discharges of conventional pollutants from existing industrial point sources. Section 304(a)(4) designated the following as conventional pollutants: biochemical oxygen demanding pollutants (BOD), total suspended solids (TSS), fecal coliform, pH, and any additional pollutants defined by the Administrator as conventional. The Administrator designated oil and grease as an additional conventional pollutant on July 30, 1979 (44 FR 44501). BCT is not an additional limitation, but replaces BAT for the control of conventional pollutants. In addition to other factors specified in Section 304(b)(4)(B), the Act requires that BCT limitations be established in light of a two-part "cost-effectiveness" test [American Paper Institute v. EPA, 660 F.2d 954 (4th Cir. 1981)]. EPA's current methodology for the general development of BCT limitations was issued in 1986 (51 FR 24974; July 9, 1986).

1.1.3 *Best Available Technology Economically Achievable (BAT) (Sections 304(b)(2)(B) of the CWA)*

In general, BAT effluent limitations guidelines represent the best economically achievable performance of plants in the industrial subcategory or category. The CWA establishes BAT as a principle means of controlling the direct discharge of priority and non-conventional pollutants to waters of the United States. The factors considered in assessing BAT include the cost of achieving

BAT effluent reductions, the age of equipment and facilities involved, the process employed, potential process changes, and non-water quality environmental impacts, including energy requirements. The Agency retains considerable discretion in assigning the weight to be accorded these factors. Unlike BPT limitations, BAT limitations may be based on effluent reductions attainable through changes in a facility's processes and operations. As with BPT, where existing performance is uniformly inadequate, BAT may require a higher level of performance than is currently being achieved based on technology transferred from a different subcategory or category. BAT may be based upon process changes or internal controls, even when these technologies are not common industry practice.

1.1.4 *New Source Performance Standards (NSPS) (Section 306 of the CWA)*

NSPS reflect effluent reductions that are achievable based on the best available demonstrated treatment technology. New plants have the opportunity to install the best and most efficient production processes and wastewater treatment technologies. As a result, NSPS should represent the most stringent controls attainable through the application of the best available control technology for all pollutants (i.e., conventional, non-conventional, and priority pollutants). In establishing NSPS, EPA is directed to take into consideration the cost of achieving the effluent reduction and any non-water quality environmental impacts and energy requirements.

1.1.5 *Pretreatment Standards for Existing Sources (PSES) (Section 307(b) of the CWA)*

PSES are designed to prevent the discharge of pollutants that pass-through, interfere-with, or are otherwise incompatible with the operation of publicly-owned treatment works (POTWs). The CWA authorized EPA to establish pretreatment standards for pollutants that pass-through POTWs or interfere with treatment processes or sludge disposal methods at a POTW. Pretreatment standards are technology-based and analogous to BAT effluent limitations guidelines.

The general Pretreatment Regulations, which set forth the framework for the implementation of categorical pretreatment standards, are found in 40 CFR Part 403. Those regulations contain a definition of pass-through that addresses localized rather than national instances of pass-through and

established pretreatment standards that apply to all non-domestic dischargers (52 FR 1586; January 14, 1987).

1.1.6 *Pretreatment Standards for New Sources (PSNS) (Section 307(b) of the CWA)*

Like PSES, PSNS are designed to prevent the discharges of pollutants that pass-through, interfere-with, or are otherwise incompatible with the operation of POTWs. PSNS are to be issued at the same time as NSPS. New indirect dischargers have the opportunity to incorporate into their plants the best available demonstrated technologies. The Agency considers the same factors in promulgating PSNS as it considers in promulgating NSPS.

1.2 *SECTION 304(M) REQUIREMENTS AND LITIGATION*

Section 304(m) of the CWA (33 U.S.C. 1314(m)), added by the Water Quality Act of 1987, requires EPA to establish schedules for (I) reviewing and revising existing effluent limitations guidelines and standards ("effluent guidelines"), and (ii) promulgating new effluent guidelines. On January 2, 1990, EPA published an Effluent Guidelines Plan (55 FR 80), that included schedules for developing new and revised effluent guidelines for several industry categories. One of the industries for which the Agency established a schedule was the “Hazardous Waste Treatment, Phase II” category. EPA subsequently changed the category name “Hazardous Waste Treatment, Phase II” to “Landfills and Incinerators”.

Natural Resources Defense Council, Inc. (NRDC) and Public Citizen, Inc. challenged the Effluent Guidelines Plan in a suit filed in U.S. District Court for the District of Columbia (*NRDC et al v. Reilly*, Civ. No. 89-2980). The district court entered a Consent Decree in this litigation on January 31, 1992. The Decree required, among other things, that EPA propose effluent guidelines for the “Landfills and Incinerators” category by December 1995 and take final action on these effluent guidelines by December 1997. On February 4, 1997, the court approved modifications to the Decree which revised the deadlines to November 1997 for proposal and November 1999 for final action. EPA provided notice of these modifications on February 26, 1997 at 62 FR 8726. Also, although “Landfills and Incinerators” is listed as a single entry in the Consent Decree schedule, EPA is

publishing two separate rulemaking actions in the Federal Register.

SECTION 2
DATA COLLECTION

In 1986, the Agency initiated a study of waste treatment facilities which receive waste from off site for treatment, recovery, or disposal. The Agency looked at various segments of the waste management industry including combustors, centralized waste treatment facilities, landfills, fuel blending operations, and waste solidification/stabilization processes (Preliminary Data Summary for the Hazardous Waste Treatment Industry, EPA 440-1-89-100, September 1989).

Development of effluent limitations guidelines and standards for the Industrial Waste Combustor Subcategory began in 1993. EPA originally looked at RCRA hazardous waste incinerators, RCRA boilers and industrial furnaces (BIFs), and non-hazardous combustion units that treat industrial waste. Sewage sludge incinerators, municipal waste incinerators, and medical waste incinerators were not included in the 1989 study or in the initial data collection effort in 1993. EPA limited this phase of the rulemaking to the development of regulations for Industrial Waste Combustors.

EPA has gathered and evaluated technical and economic data from various sources in the course of developing the effluent limitations guidelines and standards for the Industrial Waste Combustor Industry. These data sources include:

- Responses to EPA's "1992 Waste Treatment Industry Phase II: Incinerators Screener Survey",
- Responses to EPA's "1994 Waste Treatment Industry Phase II: Incinerators Questionnaire",
- Responses to EPA's "1994 Detailed Monitoring Questionnaire",
- EPA's 1993 - 1995 sampling of selected IWC facilities
- Literature data, and
- Facility NPDES and POTW wastewater discharge permit data.

EPA has used data from these sources to profile the industry with respect to: wastes received

for treatment or recovery, treatment/recovery processes, geographical distribution, and wastewater and solid waste disposal practices. EPA then characterized the wastewater generated by treatment/recovery operations through an evaluation of water usage, type of discharge or disposal, and the occurrence of conventional, non-conventional, and priority pollutants.

2.1 *CLEAN WATER ACT SECTION 308 QUESTIONNAIRES AND SCREENER SURVEYS*

2.1.1 *Development of Questionnaires and Screener Surveys*

A major source of information and data used in developing effluent limitations guidelines and standards is industry responses to questionnaires and screener surveys distributed by EPA under the Authority of Section 308 of the CWA. The questionnaires typically request information concerning treatment processes, wastes received for treatment, and disposal practices, as well as wastewater treatment system performance data. Questionnaires also request financial and economic data for use in assessing economic impacts and the economic achievability of technology options. Screener surveys generally request less detailed information than the questionnaires regarding treatment processes, wastes received for treatment, and disposal practices.

EPA used its experience with previous questionnaires to develop one screener survey (the 1992 Waste Treatment Industry Phase II: Incinerators Screener Survey) and two questionnaires (the 1994 Waste Treatment Industry Phase II: Incinerators Questionnaire and the Detailed Monitoring Questionnaire) for this project. The 1992 Waste Treatment Industry Phase II: Incinerators Screener Survey was designed to obtain general information on facility operations from a census of the industry. The 1994 Waste Treatment Industry Phase II: Incinerators Questionnaire was designed to request 1992 technical, economic, and financial data to describe industrial operations adequately from a census of facilities in the industry that were operating commercially and from a sample of facilities in the industry that were not operating commercially. The Detailed Monitoring Questionnaire was designed to elicit daily analytical data from a limited number of facilities which would be selected after receipt and review of the 1994 Waste Treatment Industry Phase II: Incinerators Questionnaire responses.

For the 1994 Waste Treatment Industry Phase II: Incinerators Questionnaire, EPA wanted to minimize the burden to IWC facilities. Thus, only a statistical sample of the non-commercial facilities meeting the preliminary scope qualifications received the 1994 Waste Treatment Industry Phase II: Incinerators Questionnaire. The questionnaire specifically requested information on:

- combustion processes,
- types of waste received for combustion,
- wastewater and solid waste disposal practices,
- ancillary waste management operations,
- summary analytical monitoring data,
- the degree of co-combustion (combustion of waste received from off site with other on-site industrial waste),
- cost of waste combustion processes, and
- the extent of wastewater recycling or reuse at facilities.

In the 1994 Waste Treatment Industry Phase II: Incinerators Questionnaire, EPA requested summary monitoring data from all recipients, but summary information is not sufficient for determining limitations and industry variability. Therefore, the Detailed Monitoring Questionnaire was designed to collect daily analytical data from a limited number of facilities. Facilities were chosen to complete the Detailed Monitoring Questionnaire based on technical information submitted in the 1994 Waste Treatment Industry Phase II: Incinerators Questionnaire. The burden was minimized in the Detailed Monitoring Questionnaire by tailoring the questionnaire to the facility operations.

EPA sent draft screener surveys and questionnaires to industry trade associations, incinerator facilities who had expressed interest, and environmental groups for review and comment. A pre-test for both the 1992 Waste Treatment Industry Phase II: Incinerators Screener Survey and the 1994 Waste Treatment Industry Phase II: Incinerators Questionnaire was conducted at nine IWC facilities to determine if the type of information necessary would be received from the questions posed as well as to determine if questions were designed to minimize the burden to facilities. Based on comments from the reviewers, EPA modified the draft questionnaire.

As required by the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq*., EPA submitted the questionnaire package (including the 1992 Waste Treatment Industry Phase II: Incinerators Screener Survey and the 1994 Waste Treatment Industry Phase II: Incinerators Questionnaire and the Detailed Monitoring Questionnaire) to the Office of Management and Budget (OMB) for review. EPA also redistributed the questionnaire package to industry trade associations, IWC facilities, environmental groups, and to any others who requested a copy of the questionnaire package.

2.1.2 *Distribution of Screener Surveys and Questionnaires*

Under the authority of Section 308 of the CWA, EPA sent the Waste Treatment Industry Phase II: Incinerators 1992 Screener Survey (OMB Approval Number: 2040-0162, Expired: 08/31/96) in September 1993 to 606 facilities that the Agency had identified as possible Industrial Waste Combustor facilities. EPA identified the 606 facilities as possible IWC facilities from various sources; such as, companies listed in the 1992 Environmental Information (EI) Directory, companies that were listed as incinerators in the RCRIS National Oversight Database (November 1992 and February 1993 versions), companies that were listed as BIF Facilities by EPA (updated December 1992), and incinerator facilities identified in the development of the Centralized Waste Treatment Industry effluent guidelines. Since the Industrial Waste Combustor Subcategory was not represented by a SIC code at the time of the survey, identification of facilities was difficult. The screener survey requested summary information on: (1) the types of wastes accepted for combustion; (2) the types of combustion units at a facility; (3) the quantity, treatment, and disposal of wastewater generated from combustion operations; (4) available analytical monitoring data on wastewater treatment; and (5) the degree of co-treatment (treatment of Industrial Waste Combustor wastewater with wastewater from other industrial operations at the facility). The responses from 564 facilities indicated that 357 facilities burned industrial waste in 1992. The remaining 207 did not burn industrial waste in 1992. Of the 357 facilities that burned industrial waste, 142 did not generate any Industrial Waste Combustor wastewater as a result of their combustion operations. Of the remaining 215 facilities that generated Industrial Waste Combustor wastewater, 59 operated commercially, and 156 only burned wastes generated on site, and/or only burned wastes generated from off-site facilities under the same corporate structure.

Following an analysis of the screener survey results, EPA sent the 1994 Waste Treatment Industry Phase II: Incinerators Questionnaire (OMB Approval Number: 2040-0167, Expired: 12/31/96) in March, 1994 to selected facilities which burned industrial waste and generated Industrial Waste Combustor wastewater. EPA sent the questionnaire to all 59 of the commercial facilities and all 16 of the non-commercial facilities that burned non-hazardous industrial waste. Further, EPA sent 32 of the remaining 140 non-commercial facilities a questionnaire. These 32 facilities were selected based on a statistical random sample. The questionnaire specifically requested information on: (1) the type of wastes accepted for treatment; (2) the types of combustion units at a facility; (3) the types of air pollution control devices used to control emissions from the combustion units at a facility; (4) the quantity, treatment, and disposal of wastewater generated from combustion operations; (5) available analytical monitoring data on wastewater treatment; (6) the degree of co-treatment (treatment of Industrial Waste Combustor wastewater with wastewater from other industrial operations at the facility); and (7) the extent of wastewater recycling and/or reuse at the facility. Information was also obtained through follow-up telephone calls and written requests for clarification of questionnaire responses.

EPA also requested a subset of Industrial Waste Combustor facilities that received a questionnaire to submit wastewater monitoring data in the form of individual data points rather than monthly or annual aggregates. Only facilities that had identified a sample point location where the stream was over 50 percent Industrial Waste Combustor wastewater received the Detailed Monitoring Questionnaire. These wastewater monitoring data included information on pollutant concentrations at various points in the wastewater treatment processes. Data were requested from 26 facilities. Sixteen of these facilities operated commercially and 10 operated non-commercially.

2.2 *SAMPLING PROGRAM*

2.2.1 *Pre-1989 Sampling Program*

In the sampling program for the 1989 Hazardous Waste Treatment Industry Study, 12 facilities were sampled to characterize the wastes received and evaluate the on-site treatment technology performance at combustors, landfills, and hazardous waste treatment facilities. Since all

of the facilities sampled had more than one on-site operation (e.g., combustion and landfill leachate generation), the data collected can not be used for this project because data were collected for mixed waste streams and the waste characteristics and treatment technology performance for the combustor facilities cannot be differentiated. Information collected in the study is presented in the Preliminary Data Summary for the Hazardous Waste Treatment Industry (EPA 440/1-89/100, September 1989).

2.2.2 *1993 - 1995 Sampling Program*

2.2.2.1 Facility Selection

Between 1993 and 1995, EPA visited 14 Industrial Waste Combustor facilities. Eight of the fourteen Industrial Waste Combustors EPA visited were captive facilities because captive facilities were still being considered for inclusion in the scope of the Industrial Waste Combustor regulation at the time of the site visits. During each visit, EPA gathered the following information:

- the process for accepting waste for combustion,
- the types of waste accepted for combustion,
- design and operating procedures for combustion technologies,
- general facility management practices,
- water discharge options,
- solid waste disposal practices, and
- other facility operations.

EPA also took one grab sample of untreated Industrial Waste Combustor scrubber blowdown water at 12 of the 14 facilities. EPA analyzed most of these grab-samples for over 450 analytes to identify pollutants at these facilities. The grab samples from the 12 site visits allowed EPA to assess whether there was a significant difference in raw wastewater characteristics from a wide variety of combustion unit types. (See Section 3 for a description of the types of combustion units.) EPA determined that the raw wastewater characteristics were similar for all types of combustion units both in the types of pollutants detected and the concentrations of pollutants detected. Specifically, organics,

pesticides/herbicides, and dioxins/furans were generally only detected, if at all, in low concentrations in the grab samples. (See Section 5 of this document for a discussion of dioxins/furans found at seven of the twelve Industrial Waste Combustor facilities sampled.) However, a variety of metal analytes were detected in significant concentrations in the grab samples.

Based on these data and the responses to the 1994 Waste Treatment Industry Phase II: Incinerators Questionnaire, EPA selected three of the Industrial Waste Combustor facilities for the BAT sampling program in order to collect data to characterize discharges and the performance of selected treatment systems. Using data supplied by the facilities, EPA applied five criteria in initially selecting which facilities to sample. The criteria were based on whether the wastewater treatment system: (1) was effective in removing pollutants; (2) treated wastes received from a variety of sources (solids as well as liquids); (3) employed either novel treatment technologies or applied traditional treatment technologies in a novel manner; (4) applied waste management practices that increased the effectiveness of the treatment unit; and (5) discharged its treated wastewater under a NPDES permit. The other 11 facilities visited were not sampled because they did not meet these criteria. Eight of these eleven facilities visited did not operate commercially, and are thus no longer in the scope of the project.

2.2.2.2 Five-Day Sampling Episodes

After a facility was chosen to participate in the five-day sampling program, a draft sampling plan was prepared which described the location of sample points and analyses to be performed at specific sample points, as well as the procedures to be followed during the sampling episode. Prior to sampling, a copy of the draft sampling plan was provided to the facility for review and comment to ensure that EPA properly described and understood facility operations. All comments were incorporated into the final sampling plan. During the sampling episode, teams of EPA employees and contractors collected and preserved samples. Samples were sent to EPA approved laboratories for analysis. Samples were collected at both influent and effluent points. Samples were also taken at intermediate points to assess the performance of individual treatment units. Facilities were given the option to split all samples with EPA, but most facilities split only effluent sample points with EPA. Following the sampling episode, a draft sampling report was prepared that included descriptions of

the treatment/recovery processes, sampling procedures, and analytical results. After all information was gathered, the reports were provided to facilities for review and comment. Corrections were incorporated into the final report. The facilities also identified any information in the draft sampling report that were considered to be Confidential Business Information (CBI).

During each sampling episode, wastewater treatment system influent and effluent streams were sampled. Samples were also taken at intermediate points to assess the performance of individual treatment units. Selected sampling information is summarized in Section 4 and Appendix A of this document. In all sampling episodes, samples were analyzed for over 450 analytes to identify the pollutants at these facilities. Again, organic compounds, pesticides/herbicides, and dioxins/furans were generally only detected in low concentrations in the composite daily samples, if they were detected at all. Dioxin/furan analytes were not detected in the sampling episode used to establish BPT/BAT/PSES. However, dioxin/furan analytes were found in the two other sampling episodes (see discussion in Section 5 of this document).

EPA completed the three sampling episodes for the Industrial Waste Combustor Subcategory from 1994 to 1995. Selection of facilities to be sampled was limited due to the small number of facilities in the scope of the project. Only eight of the operating facilities identified discharged their treated wastewater under a NPDES permit. Of these eight facilities, only five burned solid as well as liquid waste. All of the facilities sampled used some form of chemical precipitation for treatment of the metal-bearing waste streams. All of the facilities were direct dischargers and were therefore designed to effectively treat the one conventional pollutant found in this industry, TSS. Data from two of these facilities could not be used to calculate the proposed limitations and standards in combination with the third facility because they did not employ the selected treatment technology. However, data from all three facilities were used to characterize the raw waste streams. Thus, only one sampling episode contained data which were used to characterize the treatment technology performance of the Industrial Waste Combustors Industry.

Information on waste stream characteristics is included in Section 4 of this document and system performance is included in Section 6.

SECTION 3
DESCRIPTION OF THE INDUSTRY AND SUBCATEGORIZATION

3.1 *GENERAL INFORMATION*

The universe of combustion facilities currently in operation in the United State is broad. These include municipal waste incinerators that burn household and other municipal trash and incinerators that burn hazardous wastes. Other types of incinerators include those that burn medical wastes exclusively and sewage sludge incinerators for incineration of POTWs' wastewater treatment residual sludge. In addition, some boilers and industrial furnaces (e.g., cement kilns) may burn waste materials for fuel.

While many industries began incinerating some of their wastes as early as the late 1950's, the current market for waste combustion (particularly combustion of hazardous wastes) is essentially a creature of the Resource Conservation and Recovery Act (RCRA) and EPA's resulting regulation of hazardous waste disposal. Among the major regulatory spurs to combustion of hazardous wastes have been the land-ban restrictions under the Hazardous and Solid Waste Amendments (HSWA) of 1984 and clean-up agreements for Superfund sites called "Records of Decision" (RODs).

Prior to the promulgation of EPA's Land Disposal Restrictions (LDRs)(40 CFR Part 268), hazardous waste generators were free to send untreated wastes directly to landfills. The LDRs mandated alternative treatment standards for wastes, known as Best Demonstrated Available Technologies (BDATs). Quite often, combustion was the stipulated BDAT. Future modifications to the LDRs may either increase or decrease the quantity of wastes directed to the combustion sector.

The LDRs have also influenced hazardous waste management under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)(42 U.S.C §§ 9601, et. seq.). The RODs set out the clean-up plan for contaminated sites under CERCLA. A key attribute of the RODs is the choice of remediation technology. Incineration is often a technology selected for remediation. While remediation efforts contribute a minority of the wastes managed by combustion, combustion has been used frequently on remediation projects. In addition, future Congressional changes to CERCLA may affect remediation disposal volumes directed to the combustion sector.

The Agency proposed a draft Waste Minimization and Combustion Strategy in 1993 and 1994

to promote better combustion of hazardous waste and encourage reduced generation of wastes. The key projects under the broad umbrella of the strategy are: "Revised Standards for Hazardous Waste Combustors" 61 FR 17358, April 1996, the Waste Minimization National Plan completed in May 1995, and the "RCRA Expanded Public Participation Rule" 60 FR 63417, December 1995. Waste minimization will directly affect waste volumes sent to the combustion and all other waste management sectors.

In recent years, a number of contrary forces have contributed to a reduction in the volume of wastes being incinerated. Declines in waste volumes and disposal prices have been attributed to: waste minimization by waste generators, intense price competition driven by overcapacity, and changes in the competitive balance between cement kilns (and other commercial Boilers and Industrial Furnaces (BIFs)) and commercial incinerators. These trends have been offset by factors such as increased overall waste generation as part of general economic improvement, Industrial Waste Combustors consolidation, and reductions in on-site combustion.

The segment of the universe of combustion units for which EPA is proposing regulations includes all units which operate commercially and which use controlled flame combustion in the treatment or recovery of industrial waste. For example, industrial boilers, industrial furnaces, rotary kiln incinerators, and liquid-injection incinerators are all types of units included in the Industrial Waste Combustor Industry.

Combustion or recovery operations at these facilities generate the following types of wastewater, described more fully in Section 4: air pollution control wastewater, flue gas quench wastewater, slag quench, truck/equipment wash water, container wash water, laboratory drain wastewater, and floor washings from process areas. Typical non-wastewater by-products of combustion or recovery operations may include: slag or ash developed in the combustion unit itself, and emission particles collected using air pollution control systems. There are many different types of air pollution control systems in use by combustion units. The types employed by combustion units include, but are not limited to: packed towers (which use a caustic scrubbing solution for the removal of acid gases), baghouses (which remove particles and do not use any water), wet electrostatic precipitators (which remove particles using water but do not generate a wastewater stream), and venturi scrubbers (which remove particles using water and generate a wastewater stream). Thus, the

amount of wastewater and types of wastewater generated by a combustion unit are directly dependent upon the types of air pollution control systems employed by the combustion unit.

3.2 *SCOPE OF THE REGULATION*

3.2.1 *Commercial IWC Facilities*

EPA proposed effluent limitations guidelines and pretreatment standards for new and existing commercial facilities that are engaged in the combustion of industrial waste received from off-site facilities not under the same corporate ownership as the industrial waste combustor. The proposal would not apply to wastewater generated in burning wastes from intracompany transfers exclusively and/or from on-site industrial processes exclusively.

The proposed regulation applies to the discharge of wastewater associated with the operation of the following:

- RCRA Incinerators (as defined in 40 CFR 260.10 and in the Definitions Section of this document),
- RCRA Boiler and Industrial Furnaces (BIFs) (as defined in 40 CFR 260.10 and in the Definitions Section of this document), and
- Non-hazardous commercial combustors.

3.2.2 *Captive and Intra-company IWC Facilities*

As noted above, the proposal would not apply to wastewater discharges associated with combustion units that burn only wastes generated on site. Furthermore, wastewater discharges from RCRA hazardous incinerators, RCRA BIFs, and non-hazardous combustors that burn waste generated off site from facilities that are under the same corporate ownership (or effective control) as the combustor are similarly not included within the scope of this proposal. Facilities subject to the guidelines and standards would include commercial facilities whose operation is the combustion of off-site generated industrial waste as well as industrial or manufacturing combustors that burn waste

received from off-site facilities that are not within the same corporate structure.

As noted, facilities which only burn waste from off-site facilities under the same corporate structure (intracompany facility) and/or only burn waste generated on site (captive facility) are not included in the scope of the IWC proposal. EPA has decided not to include these facilities within the scope of this regulation for the following reasons. First, based on its survey, EPA identified (as of 1992) approximately 185 captive facilities and 89 facilities that burn wastes received from other facilities within the same corporate umbrella.[1] A significant number of these facilities generated no Industrial Waste Combustor wastewater. EPA's data show that 73 captive facilities (39 percent) and 36 intracompany facilities (42 percent) generated no wastewater as a result of their industrial waste combustor operations. Second, EPA believes the wastewater generated by Industrial Waste Combustor operations at most of the captive and intracompany facilities that EPA has identified are already subject to national effluent limitations (or pretreatment standards) based on the manufacturing operations at the facility. Specifically, 140 of the 156 captive and intracompany facilities which received a screener survey and generated Industrial Waste Combustor wastewater as a result of their combustion operations: 1) were either previously identified as subject to other effluent guidelines by EPA; or 2) identified themselves as subject to other effluent guidelines. There are 97 facilities subject to the Organic Chemicals, Plastics and Synthetic Fibers category (40 CFR Part 414), 17 facilities subject to the Pharmaceuticals category (40 CFR Part 439), 16 facilities subject to the Steam Electric Power Generating category (40 CFR Part 423), 3 facilities subject to the Pesticide Manufacturing category (40 CFR Part 455), and 7 facilities subject to other categories. EPA could not identify an effluent guideline category applicable to their discharges for the remaining 16 of the 156 identified captive and intracompany facilities (five of these are federal facilities).

Also, 83 percent of all captive facilities and 73 percent of all intracompany facilities reported that the combustion unit wastewaters made up less than 20 percent of the final wastewater stream discharged from each facility. EPA concluded that, in these circumstances, it is likely that the

[1]As explained in Section 2, EPA conducted an extensive survey (with follow-up questionnaire), in part, to characterize the universe of facilities being considered for regulation. Following proposal, EPA plans to review its screener survey and questionnaire results in order to confirm the accuracy of its assignment of wastewater flows and facilities as captive, intracompany, or commercial Industrial Waste Combustors.

Industrial Waste Combustor waste streams are being treated along with other categorical waste. Also, 71 percent of all captive facilities and 67 percent of all intracompany facilities reported that their IWC wastewater is covered as process wastewater under existing EPA effluent limitations (40 CFR Parts 405-471). This indicates that most Industrial Waste Combustor waste streams are subject either directly (where discharged separately) or when mixed with other wastes subject to national effluent guidelines (or pretreatment standards) comparable to those being considered here. Given these facts, EPA has concluded preliminarily that it should not include such captive or intracompany facilities within the scope of the proposed IWC rule.

3.3 *SUMMARY INFORMATION ON 84 COMMERCIAL IWC FACILITIES*

For 1992, EPA identified 84 combustor facilities that accept hazardous or non-hazardous industrial waste from off-site facilities not under the same corporate umbrella for combustion. The following tables provide summary information from the 1992 Waste Treatment Industry Phase II: Incinerators Screener Survey on these 84 combustor facilities.

Many of the 84 commercial IWC facilities have more than one unit on site. The majority of facilities with two or more units on site operate boilers, industrial furnaces, or cement, lime, or aggregate kilns. Table 3-1 presents the number of thermal units at each of the 84 IWC facilities.

Table 3-1. Number of Thermal Units at Each of the 84 Commercial IWC Facility Locations

Number of Units	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**>8**
Number of Facilities	39	23	9	6	2	1	0	0	1

There are more industrial furnaces, boilers, cement kilns, lime kilns, and aggregate kilns than any other unit types. However, more than one of these units often exist at a single facility. Table 3-2 presents the unit types at all 84 IWC facilities.

Most of the waste burned by the 84 IWC facilities is hazardous or non-hazardous industrial waste containing organic compounds. Only one facility indicated that it burned waste containing dioxins/furans, and only four facilities indicated burning waste regulated under the Toxic Substances

Table 3-2. Types of Thermal Units at 84 Commercial IWC Facilities

Type of Thermal Unit	Number of Each Unit Type
Rotary Kiln Incinerator	23
Liquid Injection Incinerator	17
Fluidized-Bed Incinerator	1
Multiple-Hearth Incinerator	6
Fixed-Hearth Incinerator	3
Pyrolytic Destructor	3
Industrial Boiler	32
Industrial Furnace	38
Cement, Lime, or Aggregate Kiln	31
Other	19

Control Act (TSCA). Table 3-3 presents the types and amount of waste treated at all 84 IWC facilities.

For the proposed IWC regulations, only air pollution control water, slag quench and flue gas quench are considered "IWC Wastewater." The largest wastewater stream generated by the 84 IWC facilities, stormwater runoff, is regulated under other effluent guidelines. The industry also generates large quantities of boiler blowdown. Boiler blowdown wastewater was not considered for regulation for this industry because it does not come into contact with any of the wastes being burned. Table 3-4 presents the quantity of process wastewater generated by the 84 IWC facilities.

3.4 *SUMMARY INFORMATION ON 26 COMMERCIAL IWC FACILITIES WHICH GENERATE IWC WASTEWATER*

Following the distribution of the screener survey, EPA sent the 1994 Waste Treatment Industry Phase II: Incinerators Questionnaire to only those commercial facilities that generated IWC wastewater. Fifty-eight of the 84 commercial IWC facilities did not generate any IWC wastewater;

Table 3-3. Amount of Waste Treated by 84 Commercial IWC Facilities in Calendar Year 1992 (Tons)

	Tons							# of Facilities
Waste Type	**1-50**	**51-100**	**101-500**	**501-1,000**	**1,001-5,000**	**5,001-10,000**	**> 10,000**	
Non-RCRA								
Sewage Sludge	0	1	0	0	0	0	0	1
Municipal Waste	0	0	0	1	1	0	0	2
Containing Metals	3	0	4	1	4	1	4	17
Containing Organics	13	4	10	1	11	5	7	51
All Other Types	7	0	5	1	7	0	1	21
RCRA								
Containing Metals	6	0	3	3	7	2	20	41
Containing Organics	10	2	6	5	5	6	32	66
Containing Dioxins/Furans	0	0	1	0	0	0	0	1
Containing Pesticides/ Herbicides	0	2	1	1	8	0	1	13
All Other Types	3	0	1	1	1	1	6	13
Special								
Radioactive Wastes	1	0	0	0	0	0	0	1
TSCA Wastes (PCBs)	0	0	0	0	1	0	3	4
Medical Wastes	0	0	1	0	0	0	0	1

thus, EPA only has detailed operation information on the 26 commercial IWC facilities that generated wastewater. The following tables provide summary information from the 1994 Waste Treatment Industry Phase II: Incinerators Questionnaire from these 26 combustor facilities.

Table 3-4. Quantity of Process Wastewater Generated by 84 Commercial IWC Facilities in Calendar Year 1992 (Thousand Gallons)

Type of Process Water	Gallons (1,000s)							# of Facilities
	0-5	5-15	15-50	50-100	100-500	500-750	>750	
None	25	0	0	0	0	0	0	25
Air Pollution Control Wastewater	2	1	2	2	0	0	14	21
Slag Quench	1	0	2	0	2	0	0	5
Process Area Washdown	6	2	3	1	5	0	4	21
Truck/Equipment Wash Water	2	0	2	2	2	0	3	11
Container Wash Water	2	0	1	1	1	1	0	6
Stormwater Runoff	2	2	0	2	3	3	17	29
Laboratory Wastewater	5	0	0	2	3	0	1	11
Flue Gas Quench Wastewater	2	0	1	0	0	0	8	11
Boiler Blowdown	6	1	3	1	0	3	11	25
Other	2	0	3	0	0	0	9	14

3.4.1 *RCRA Designation of 26 Commercial IWC Facilities*

Most of the 26 facilities that generate IWC wastewater are regulated as incinerators under RCRA. Very few boilers and industrial furnaces regulated under RCRA generate air pollution control wastewater, flue gas quench, or slag quench. There were no non-RCRA industrial waste combustors that generated IWC wastewater identified by EPA. Table 3-5 presents the RCRA designation of the 26 commercial facilities.

Table 3-5. 1992 RCRA Designation of 26 Commercial IWC Facilities

	Total Thermal Units
Hazardous Waste Incinerator	25
Boiler and/or Industrial Furnace	8
Exempt under 40 CFR Part 264 Subpart O	0

3.4.2 *Waste Burned at 26 IWC Facilities*

The number of customers served by a facility varies greatly in this industry. Some facilities burn primarily waste generated on site and take very few waste shipments from facilities not under their corporate structure. Other facilities operate a strictly commercial operation, serving hundreds or thousands of customers on a regular basis. Table 3-6 presents the number of customers served by the 26 commercial facilities.

Table 3-6. Number of Customers/Facilities Served in 1992 by 26 Commercial IWC Facilities

	Number of Customers
Minimum	1
Maximum	4,000
Mean	807
Median	75
Total	27,452

3.4.3 *Air Pollution Control Systems for 26 Commercial IWC Facilities*

The type of air pollution control system used by an IWC facility has a direct effect on the characteristics and quantity of the IWC wastewater generated by that facility. Table 3-7 presents the types of air pollution control systems in use at the 26 commercial facilities. Table 3-8 presents the

types of air pollutants for which add-on control systems are in operation for the 26 IWC facilities. Some of these systems do not generate any wastewater (e.g., a fabric filter for particulate removal). Other systems would generate wastewater (e.g., a packed tower scrubber with lime used for halogenated acid gas removal).

Table 3-7. Types of Air Pollution Control Systems at 26 Commercial IWC Facilities

Type of Air Pollution Control System	Total Thermal Units
Spray Chamber Scrubber	16
Impingement Baffle Scrubber	2
Wet Cyclone (including multiclones)	2
Venturi Scrubber	12
Sieve Tray Tower	2
Packed Tower	16
Ionizing Wet Scrubber	4
Wet Electrostatic Precipitator	3
Fabric Filter	11
Dry Scrubber	2
Spray Dryer	1
Other (Includes: Demister; Dry Cyclone; Dry Electrostatic Precipitator; Horizontal Packed Absorber; Scrubber Quench Unit; Steam Atomization)	14

Of the facilities that use water in their air pollution control systems, the chemicals added to the water and the types of water recirculation systems vary greatly by facility. The addition of chemicals to the water is dependent upon the purpose of the scrubbing system (e.g., no chemicals would be used to trap particulates in a cyclonic scrubber and sodium hydroxide would be used to remove halogenated acid gases in a packed tower scrubber.) The chemicals added to the scrubber

Table 3-8. Air Pollutants for Which Add-On Control Systems are in Operation for 26 Commercial IWC Facilities

Air Pollutant	Total Thermal Units
None	2
Halogenated Acid Gases	21
Sulfur Compounds	19
Nitrogen Compounds	7
Particulates	30
Metals	23
Other (Organics)	1

water would have a direct effect on the characteristics of the wastewater generated. Table 3-9 presents the types of scrubbing liquors in use at the 26 commercial IWC facilities.

Table 3-9. Scrubbing Liquor Used in Air Pollution Control Systems of 26 Commercial IWC Facilities

Scrubbing Liquor	Total Thermal Units
None	7
Water With No Added Chemicals	13
Sodium Hydroxide	17
Lime Slurry	8
Other (Includes: Lime-Hydrated; Sodium Carbonate Solution; Sulfuric Acid)	7

The type of water recirculation system used by a facility also has a direct effect on the amount of wastewater generated. If a facility operated a closed loop air pollution control system with no discharge, no wastewater would be generated. Alternately, a facility that did not recirculate its air pollution control system wastewater, would tend to generate a large quantity of wastewater. Table

3-10 presents the types of water recirculation systems.

Table 3-10. Type of Water Recirculation System Used in Air Pollution Control Systems at the 26 Commercial IWC Facilities

Water Recirculation System	Total Thermal Units
None (once through)	2
Closed Loop (no discharge)	7
Recirculating with Intermittent Blowdown	1
Recirculating with Continuous Blowdown	14

3.5 *SUMMARY INFORMATION ON 11 COMMERCIAL IWC FACILITIES WHICH GENERATE AND DISCHARGE IWC WASTEWATER*

Thirteen of the twenty-six facilities generate Industrial Waste Combustor wastewater but do not discharge the wastewater to a receiving stream or to a POTW. These facilities are considered "zero or alternative dischargers" and use a variety of methods to dispose of their wastewater. At these facilities: (1) wastewater is sent off site for treatment or disposal (four facilities); (2) wastewater is burned or evaporated on site (five facilities); (3) wastewater is sent to a surface impoundment on site (three facilities); and (4) wastewater is injected underground on site (one facility). Thus, EPA has identified only 13 facilities that were discharging Industrial Waste Combustor wastewater to a receiving stream or to a POTW in 1992. Of these 13 facilities, 2 facilities have either stopped accepting waste from off site for combustion or have closed their combustion operations since 1992. Eight of the eleven open facilities discharge their Industrial Waste Combustor wastewater to a receiving stream and three of the eleven facilities discharge their Industrial Waste Combustor wastewater to a POTW. These 11 facilities are found near the industries generating the wastes undergoing combustion.

The 11 open facilities identified by EPA operate a wide variety of combustion units. Four facilities operate rotary kilns and are regulated as incinerators under RCRA. Three facilities operate liquid injection incinerators and are regulated as incinerators under RCRA. Three facilities operate

furnaces and are regulated as BIFs under RCRA. One facility operates a liquid injection device and is regulated as a BIF under RCRA. And, one facility operates a combustion device that is not regulated as a BIF or as an incinerator under RCRA.

The 11 open facilities identified by EPA use a wide variety of air pollution control systems. The types of air pollution control systems in use are: fabric filters, spray chamber scrubbers, packed tower scrubbers, ionizing wet scrubbers, venturi scrubbers, dry scrubbers, dry cyclones, and wet electrostatic precipitators. Ten of the 11 open facilities use more than one of the air pollution control systems listed above. Six of the eleven facilities use a combination of wet and dry air pollution control systems. Four of the eleven facilities use only wet air pollution control systems. It is unknown what types of air pollution systems are used by two of the facilities.

3.6 *INDUSTRY SUBCATEGORIZATION*

Division of an industry into groupings entitled "subcategories" provides a mechanism for addressing variations between products, raw materials, processes, and other parameters which result in distinctly different effluent characteristics. Regulation of an industry by subcategory provides that each has a uniform set of effluent limitations which take into account technology achievability and economic impacts unique to that subcategory.

The factors considered in the regulation of the Industrial Waste Combustor Industry include:

- waste type received;
- type of combustion process;
- air pollution control used;
- nature of wastewater generated;
- facility size, age, and location;
- non-water quality impact characteristics; and
- treatment technologies and costs.

EPA evaluated these factors and determined that subcategorization is not required.

For most facilities in this industry, a wide variety of wastes are combusted. These facilities,

however, employ the same wastewater treatment technologies regardless of the specific type of waste being combusted in a given day.

EPA concluded that a number of factors did not provide an appropriate basis for subcategorization. The Agency concluded that the age of a facility should not be a basis for subcategorization because many older facilities have unilaterally improved or modified their treatment process over time. Facility size is also not a useful technical basis for subcategorization for the Industrial Waste Combustor Industry because wastes can be burned to the same level regardless of the facility size and has no significant relation to the quality or character of the wastewaters generated or treatment performance. Likewise, facility location is not a good basis for subcategorization; no consistent differences in wastewater treatment performance or costs exist because of geographical location. Non-water quality characteristics (waste treatment residuals and air emission effects) did not constitute a basis for subcategorization. The environmental effects associated with disposal of waste treatment residual or the transport of potentially hazardous wastewater are a result of individual facility practices. The Agency did not identify any consistent basis for these decisions that would support subcategorization. Treatment costs do not appear to be a basis for subcategorization because costs will vary and are dependent on the following waste stream variables: flow rates, waste quality, waste energy content, and pollutant loadings. Therefore, treatment costs were not used as a factor in determining subcategories.

EPA identified three factors with significance for potentially subcategorizing the Industrial Waste Combustor Industry: the type of waste received for treatment, the type of air pollution control system used by a facility, and the types of Industrial Waste Combustor wastewater sources (e.g., container wash water vs. air pollution control water).

A review of untreated Industrial Waste Combustor air pollution control system wastewater showed that there is some difference in the concentration of pollutants between solid and liquid waste combustion units. In particular, for nine of the 27 metals analyzed at six Industrial Waste Combustor facilities, the average concentration of a particular metal was higher in the water from facilities that burned solids (as well as liquids) than in facilities that burned liquids only. EPA believes that this difference is probably the result of two factors: the type of air pollution control employed by the facilities and the amount of wastewater generated. Specifically, the data reviewed by EPA showed

that two of the three facilities that burn liquid waste use dry scrubbing devices prior to using scrubbing devices which generate wastewater. One of these facilities uses a baghouse initially and the other uses a fabric filter. These dry scrubbers would remove some of the metals which would have ended up in the wastewater stream. In comparison, only one of the three facilities that burn solids uses a dry scrubbing device prior to using scrubber devices which generate wastewater. This facility uses an electrostatic precipitator initially. In addition, all three of the facilities that burn liquid waste do not recycle any of their wastewater for reuse in the scrubbing system following partial wastewater treatment. In comparison, two of the three facilities that burn solids recycle some of their partially treated wastewater for reuse in their scrubbing system. One of these facilities recycles 60 percent and the other recycles 82 percent. The reuse of partially treated wastewater would have the effect of reducing the wastewater discharge and increasing the concentration of metals in the recycled wastewater. Thus, it is difficult to assess whether there is in fact any significant difference in the concentrations of pollutants in wastewater from facilities burning solid versus liquid waste. This situation in general makes subcategorizing on this basis difficult. Therefore, EPA has concluded that available data do not support subcategorization either by the type of waste received for treatment or the type of air pollution control system used by a facility.

Based on analysis of the Industrial Waste Combustor Industry, EPA has determined that it should not subcategorize the Industrial Waste Combustors for purposes of determining appropriate limitations and standards.

SECTION 4
WASTEWATER USE AND WASTEWATER CHARACTERIZATION

In 1993, under authority of Section 308 of the Clean Water Act (CWA), the EPA distributed the "Waste Treatment Industry Phase II: Incinerators 1992 Screener Survey" and, subsequently, the "1994 Waste Treatment Industry Phase II: Incinerators Questionnaire" to facilities that EPA had identified as possible IWC facilities. Responses to the screener survey and questionnaire indicated that, in 1992, 13 IWC facilities operated commercially and discharged their IWC wastewater to a receiving stream or to a POTW. Of these 13 facilities, 2 facilities have either stopped accepting waste from off site for combustion or have closed their combustion operations since 1992. Thus, this section presents information on water use at only the remaining 11 facilities. This section also presents information on wastewater characteristics for the IWC facilities that were sampled by EPA and for some of those facilities that provided self-monitoring data.

4.1 *WATER USE AND SOURCES OF WASTEWATER*

Approximately 861 million gallons of wastewater are generated and discharged annually at the 11 Industrial Waste Combustor facilities. EPA has identified the sources described below as contributing to wastewater discharges at Industrial Waste Combustor operations. Only air pollution control wastewater, flue gas quench, and slag quench, however, would be subject to the proposed effluent limitations and standards. Most of the wastewater generated by Industrial Waste Combustor operations result from these sources.

a. Air Pollution Control System Wastewater. Particulate matter in the effluent gas stream of an Industrial Waste Combustor is removed by four main physical mechanisms (Handbook of Hazardous Waste Incineration, Brunner 1989). One mechanism is interception, which is the collision between a water droplet and a particle. Another method is gravitational force, which causes a particle to fall out of the direction of the streamline. The third mechanism is impingement, which causes a water particle to fall out of the streamline due to inertia. Finally, contraction and expansion of a gas stream allow particulate matter to be removed from the stream. Thus, removal of particulate matter can be accomplished with or without the use of water. Depending upon the type of waste being burned,

Industrial Waste Combustors may produce acid gases in the air pollution control system. In order to collect these acid gases, a caustic solution is generally used in a wet scrubbing system.

b. Flue Gas Quench Wastewater. Water is used to rapidly cool the gas emissions from combustion units. There are many types of air pollution control systems that are used to quench the gas emission from Industrial Waste Combustors. For example, in packed tower scrubbing systems, water enters from the top of the tower and gas enters from the bottom. Water droplets collect on the packing material and are rinsed off by the water stream entering the top of the tower (Handbook of Hazardous Waste Incineration, Brunner 1989). This rapidly cools the gas stream along with removing some particulate matter.

c. Slag Quench Wastewater. Water is used to cool molten material generated in slagging-type combustors.

d. Truck/Equipment Wash Water. Water is used to clean the inside of trucks and the equipment used for transporting wastes.

e. Container Wash Water. Water is used to clean the insides of waste containers.

f. Laboratory Wastewater. Water is used in on-site laboratories which characterize incoming waste streams and monitor on-site treatment performance.

g. Floor Washings and Other Wastewater from Process Area. This includes stormwater which comes in direct contact with the waste or waste handling and treatment areas. (Stormwater which does not come into contact with the wastes would not be subject to today's proposed limitations and standards. However, this stormwater is covered under the NPDES stormwater rule, 40 CFR 122.26).

4.2 *WATER USE BY MODE OF DISCHARGE*

As mentioned in Section 4.1, approximately 861 million gallons of wastewater were discharged from 11 of the 84 commercial industrial combustors identified by EPA based on questionnaire responses. Eight of the 11 facilities discharge wastewater directly into a receiving stream or body of water. The other three facilities discharge indirectly by introducing their wastewater into a publicly-owned treatment works (POTW). Table 4-1 presents the total, average, and range of discharge flow rates for the eight direct and the three indirect discharging facilities. There are 71 facilities that either do not generate any Industrial Waste Combustor wastewater (58)

or do not discharge their wastewater to a receiving stream or POTW (13) as discussed previously. In general, the primary types of wastewater discharges from discharging facilities are: air pollution control system wastewater and flue gas quench. EPA is using the phrase "Industrial Waste Combustor wastewater" to refer to these three types of wastewaters only. Other types of wastewater generated as a result of combustor operations (e.g., truck washing water) are not considered "Industrial Waste Combustor wastewater".

This regulation applies to direct and indirect discharges only.

Table 4-1. Amount of IWC Wastewater Discharged

Type of Discharger	Number of Facilities	Total Amount of IWC Wastewater Discharged (Gallons/Day)	Average Amount of IWC Wastewater Discharged (Gallons/Day)	Range In Amount of IWC Wastewater Discharged (Gallons/Day)
Direct	8	2,110,799	263,850	14 to 1,000,286
Indirect	3	225,812	75,271	89 to 113,867

4.3 *WASTEWATER CHARACTERIZATION*

The Agency's five-day sampling program for this industry detected 21 pollutants (conventional, priority, and non-conventional) in waste streams at treatable levels at the facility that provides the basis for the BPT/BAT limits. Two additional pollutants were detected at treatable levels in the two other five-day sampling episodes: strontium and dichlorprop. The quantity of these pollutants currently being discharged from all facilities is difficult to assess. Limited monitoring data are available from facilities for the list of pollutants identified from the Agency's sampling program prior to commingling of these wastewaters with non-contaminated stormwater and other industrial wastewater before discharge. EPA used monitoring data supplied in the 1994 Waste Treatment Industry Phase II: Incinerators Questionnaire and data supplied in the Detailed Monitoring Questionnaire, wastewater permit information, and EPA sampling data to estimate raw waste and

current pollutant discharge levels. EPA used a “non-process wastewater” factor to quantify the amount of non-contaminated stormwater and other industrial process water in a facility's discharge. Section 4.4 of this document provides a more detailed description of “non-process wastewater” factors and their use. A facility's current discharge of treated Industrial Waste Combustor wastewater was calculated using the monitoring data supplied multiplied by the “non-process wastewater” factor.

4.3.1 *Conventional Pollutants*

The most appropriate conventional pollutant parameters for characterizing untreated wastewater and wastewater discharged by IWC facilities are:

- Total Suspended Solids, and
- pH

Total solids in wastewater are defined as the residue remaining upon evaporation at just above the boiling point. Total suspended solids (TSS) is the portion of the total solids that can be filtered out of the solution using a 1 micron filter. Untreated wastewater TSS content is a function of the type and form of waste accepted for treatment (e.g., wastewater that results from the combustion of solid waste receipts would tend to have higher TSS values than waste received in a liquid form). TSS can also be due to treatment chemicals added to the wastewater as it is being generated (e.g., a caustic solution may be used in an IWC air pollution control system). The total solids are composed of matter which is settleable, in suspension or in solution, and can be removed in a variety of ways, such as during the metals precipitation process or by multimedia filtration, depending on a facility’s operation. Untreated wastewater TSS levels found in the three five-day EPA sampling episodes are presented in Table 4-2.

The pH of a solution is a unitless measurement which represents the acidity or alkalinity of a wastewater stream, based on the dissociation of the acid or base in the solution into hydrogen (H+) or hydroxide (OH-) ions, respectively. Untreated wastewater pH is a function of the source of waste receipts as well as a function of the chemicals used in the air pollution control devices. This parameter can vary widely from facility to facility. Control of pH is necessary to achieve proper

removal of pollutants in the BPT/BAT treatment system (chemical precipitation).

As shown in Table 4-2, raw waste five-day biochemical oxygen demand and oil and grease are very low, ranging from 1 mg/l to 53 mg/l and from 5 mg/l (not detected) to 6 mg/l, respectively. Both of these parameters are indirect measures of the organic strength of wastewater. The wastewater sampled by EPA is generated from air pollution control systems and consists primarily of inorganic pollutants and very low concentrations of organic compounds because they are destroyed during combustion. (Furthermore, a more direct measure of the organic strength of the raw wastewater, total organic carbon, also shown in Table 4-2, only ranges from 10 mg/l (not detected) to 16 mg/l).

Table 4-2. Range of Pollutant Influent Concentrations of the Pooled Daily Data form the Three Five-Day EPA Sampling Episodes (ug/l)

Pollutant	Mean	Minimum	Maximum
Aluminum	897.6	13.6	2,538.0
Ammonia as Nitrogen	14,312.4	100.0	75,000.0
Antimony	268.2	7.8	958.8
Arsenic	166.4	4.6	827.2
BOD_5	9,960	1,000	53,000
Boron	1,604.6	918.0	3,760.0
Cadmium	312.2	1.8	2,616.0
Calcium	293,146.0	8,140.0	1,270,000.0
Chemical Oxygen Demand	343,140.0	67,000.0	1,036,000.0
Chloride	6,833,746.7	1,010,000.0	17,002,400.0
Chromium	127.2	5.8	529.2
Copper	1,786.7	8.5	10,554.0
Fluoride	82,620.5	16,500.0	360,000.0
Iron	2,904.1	149.0	10,838.0

Table 4-2. (Continued)

Pollutant	Mean	Minimum	Maximum
Lead	1,613.9	2.1	13,248.0
Manganese	114.7	4.0	388.0
Mercury	21.1	0.2	115.4
Molybdenum	336.7	4.6	1024.4
Nitrate/Nitrite	2,650.9	360.0	4,560.0
Oil and Grease	5,067	5,000	6,000
Phosphorus	32,480.0	3,210.0	225,800.0
Potassium	77,743.0	1,310.0	195,400.0
Selenium	102.8	2.3	429.2
Silicon	15,414.0	5,380.0	28,100.0
Silver	98.9	1.0	390.8
Sodium	3,443,333.3	6,400.0	11,250,600.0
Strontium	630.2	100.0	2,280.0
Sulfur	400,788.1	2,145.0	1,078,240.0
Tin	665.9	14.5	6,046.0
Titanium	777.7	5.0	4,474.2
Total Dissolved Solids	12,815,853.3	158,000.0	32,641,200.0
Total Organic Carbon	10,485	10,000	16,000
Total Phosphorus	1,088.6	10.0	4,460.0
Total Sulfide	28,261.3	1,000.0	103,200.0
Total Suspended Solids	122,553.3	4,000.0	522,000.0
Zinc	3,718.8	89.8	12,310.0
Dichlorprop	7.7	1.0	47.0
MCPP	375.7	50.0	2,594.0

4.3.2 *Priority and Non-Conventional Pollutants*

Table 4-2 below presents the range of the pooled daily pollutant influent concentration data from the three five-day EPA sampling episodes. This table includes treatment chemicals and nutrients found in IWC wastewater as well as pollutants to be removed from IWC wastewater. Appendix A presents this information for all pollutants analyzed in the three five-day EPA sampling episodes.

4.4 *WASTEWATER POLLUTANT DISCHARGES*

As previously discussed, most of the effluent monitoring data received from facilities included non-IWC wastewater, such as other industrial waste streams and stormwater. Due to the lack of effluent data for IWC wastewater, the EPA had to develop various methods to estimate their current wastewater pollutant discharge. This section describes the various methodologies used to estimate current performance.

Most of the data supplied by the IWC facilities represented data that included non-IWC wastewater in the form of noncontaminated stormwater and other industrial stormwater prior to discharge. Therefore, the amount of a pollutant in the final effluent would be equal to the amount of the pollutant in the IWC process in addition to the amount in the non-IWC process, as shown in Equation 4.1.

$$C_T * F_{TOTAL} = C_{IWC} * F_{IWC} + C_{NON\text{-}IWC} * F_{NON\text{-}IWC} \quad (4.1)$$

where:

C_T = Concentration of pollutant in the combined wastewater stream -- the concentration reported in the Incinerators Questionnaire, the Incinerators Detailed Monitoring Questionnaire, in POTW permits, in NPDES permits, or from EPA sampling program.

F_{TOTAL} = Flowrate of total wastewater stream.

C_{IWC} = Concentration of pollutant in the IWC (and other similar) wastewater

streams.

F_{IWC} = Flowrate of IWC (and other similar) wastewater streams.

$C_{NON-IWC}$ = Concentration of pollutant in stormwater or non-contact wastewater streams.

$F_{NON-IWC}$ = Flowrate of stormwater or non-contact wastewater streams.

Stormwater or non-contact wastewater was assumed to be significantly lower in concentration in comparison to the IWC wastewater, and thus, the concentration of non-IWC wastewater streams was set equal to zero. This assumption simplifies Equation 4.1 as shown in Equation 4.2 below. Also, other industrial wastewater streams were assumed to have the same concentrations as the IWC wastewater streams.

$$C_T * F_{TOTAL} = C_{IWC} * F_{IWC} \quad (4.2)$$

For each facility, the EPA calculated the portion of IWC wastewater in the facility discharge and then calculated the IWC effluent concentration by solving Equation 4.2. Thus, the non-process wastewater factor is the flowrate of the total wastewater stream divided by the flowrate of the IWC (and other similar) wastewater stream.

The hierarchy of data used to estimate current loading concentrations was as follows:

1.) **Detailed Monitoring Questionnaire (DMQ) for the Incinerators Industry data from effluent sample locations for 1992.** The facility's long-term monitoring data was supplied in this questionnaire. Often, this data had to be corrected for inclusion of non-IWC wastewater streams using Equation 4.2 above.

2.) **Detailed Monitoring Report (DMR) data from effluent sample locations for 1992.** The facility's long-term monitoring data was supplied to EPA in this report. Often, this data had to be corrected for inclusion of non-IWC wastewater streams using Equation 4.2 above.

3.) **Waste Treatment Industry Phase II: Incinerators Questionnaire data from effluent sample locations for 1992.** The facility's year-long monitoring data was supplied in this questionnaire. Often, this data had to be corrected for inclusion of non-IWC wastewater streams

using Equation 4.2 above.

4.) **POTW or NPDES permit effluent concentrations for 1992.** Often, this data had to be corrected for inclusion of non-IWC wastewater streams using Equation 4.2 above.

5.) **EPA Five-Day Sampling Data for Three IWC facilities.** This data was used either for specific facilities sampled or averages were obtained to model facilities for which limited data was available.

6.) **Averages from Similar Facilities.** Data averages from similar facilities were used to model current loadings concentrations for facilities for which limited data was available.

The average, flow-weighted, estimated current discharge concentration for facilities in the IWC Industry is presented in Table 4-3.

Table 4-3. IWC Industry Current Discharge Concentration

Pollutant	Discharge Concentration	Unit
CHEMICAL OXYGEN DEMAND	145.2	mg/l
TOTAL DISSOLVED SOLIDS	10,430.0	mg/l
TOTAL SUSPENDED SOLIDS	30.6	mg/l
ALUMINUM	663.7	ug/l
ANTIMONY	559.0	ug/l
ARSENIC	217.7	ug/l
BORON	1,614.9	ug/l
CADMIUM	118.4	ug/l
CHROMIUM	4,276.9	ug/l
COPPER	944.2	ug/l
IRON	306.2	ug/l
LEAD	363.4	ug/l
MANGANESE	156.2	ug/l
MERCURY	10.6	ug/l
MOLYBDENUM	239.2	ug/l
SELENIUM	34.2	ug/l
SILVER	31.0	ug/l
TIN	88.4	ug/l
TITANIUM	79.6	ug/l
ZINC	385.6	ug/l

SECTION 5
POLLUTANTS AND POLLUTANT PARAMETERS SELECTED FOR REGULATION

As previously discussed, EPA evaluated wastewater sampling data that was collected for this industry in order to determine the pollutants that were further evaluated for the proposed regulation; the "pollutants of concern" for the Industrial Waste Combustor (IWC) Industry. This section discusses the pollutants and pollutant parameters detected in the Industrial Waste Combustor Industry.

5.1 *POLLUTANT PARAMETERS*

In addition to looking at specific pollutants in wastewater, EPA also relies on a number of other yardsticks for evaluating water quality. Some of these pollutant parameters, like total suspended solids (TSS), measure the conventional pollutants while others, like chemical oxygen demand (COD), are surrogates for non-conventional pollutants like ammonia. Traditionally, EPA has regulated conventional pollutants only in direct discharge permits and has not regulated discharges of conventional pollutants by facilities which are indirect dischargers.

The pollutant parameters proposed for regulation are a function of the characteristics of IWC wastewater. In the IWC wastewater, TSS, COD, and total dissolved solids (TDS) were the only pollutant parameters found at treatable concentrations. COD is not proposed for regulation because the technology selected for BPT/BAT will not effectively reduce COD levels. Also, TDS is not proposed for regulation because EPA's data showed that the treatment chemicals associated with the technology selected for BPT/BAT increase the TDS levels. EPA is proposing to regulate TSS. The level of TSS detected in IWC wastewater is important because of its correlation to treatment unit effectiveness.

5.2 *PRIORITY AND NON-CONVENTIONAL POLLUTANTS*

During sampling visits at the beginning of EPA's study of this industry, EPA analyzed for more than 450 priority, conventional, and non-conventional pollutants, listed in Appendix A. All

pollutants listed in Appendix A have EPA approved analytical methods, including RCRA and TSCA compounds. All of these pollutants were analyzed to characterize the full range of wastewater pollutants that are observed in the IWC Industry.

The Agency has not proposed to regulate any pollutant that was not detected in the sampling episodes at least three times at a significant concentration. Dioxins/furans were not selected for regulation because they were detected infrequently and at low concentrations. A further discussion of dioxins/furans in the IWC Industry appears below.

5.2.1 *Dioxins/Furans in Industrial Waste Combustor Subcategory*

1. Background. Scientific research has identified 210 isomers of chlorinated dibenzo-p-dioxins (CDD) and chlorinated dibenzofurans (CDF). EPA attention has primarily focused on the 2,3,7,8-substituted congeners, a priority pollutant under the CWA, of which 2,3,7,8- TCDD and 2,3,7,8-TCDF are considered the most toxic. Evidence suggests that non-2,3,7,8-substituted congeners may not be as toxic. Some sources report that these non-2,3,7,8-substituted congeners may either be broken down or quickly eliminated by biological systems.

Dioxins and furans are formed as a by-product during many industrial and combustion activities, as well as during several other processes. The combustion activities that may create dioxins under certain conditions may include:

- Combustion of chlorinated compounds; including PCBs;
- Some metals are suspected to serve as catalysts in the formation of dioxin/furans;
- Metal processing and smelting;
- Petroleum refining;
- Chlorinated organic compound manufacturing.

2. Dioxin/Furans in Industrial Waste Combustor Wastewater. EPA identified a number of dioxin/furan compounds as present in the untreated wastewater streams at seven of the twelve facilities sampled (including grab and composite samples). Two of the facilities with dioxins detected in their Industrial Waste Combustor wastewater are now closed and no longer within the scope of

the proposed rule, so data from these facilities has not been further considered here. Thus, the following discussion relates to data from the ten remaining facilities (a total of 32 aqueous samples). Table 5-1 below summarizes the dioxin/furans detected in IWC wastewaters during the sampling program. Similar isomers that contain the 2,3,7,8 base were grouped together for this analysis due to their similar nature and characteristics.

Table 5-1. Breakdown of Detected Dioxin/Furans During IWC Sampling Program

Dioxin/Furan	Toxic Equivalent Value (TEQ)	Universal Treatment Standards	Mean concentrations IWC Industry (detects only)	Total # of aqueous samples detected (out of 32)	# of facilities detected (out of 10)
2,3,7,8- TCDF	0.1	63,000 pg/l	17 pg/l	2	2
2,3,7,8- PeCDF	0.5	35,000 pg/l	93 pg/l	1	1
2,3,7,8- HxCDD	0.1	63,000 pg/l	68 pg/l	1	1
2,3,7,8- HxCDF	0.1	63,000 pg/l	249 pg/l	7	3
2,3,7,8- HpCDD	0.01	none	272 pg/l	5	4
2,3,7,8- HpCDF	0.01	none	939 pg/l	7	4
OCDD	0.001	none	971 pg/l	10	5
OCDF	0.001	none	6165 pg/l	6	4

It is important to note that EPA did not detect 2,3,7,8-TCDD (the most toxic congener) or 2,3,7,8-PeCDD in the raw wastewater samples collected. The dioxin/furans detected in untreated Industrial Waste Combustor wastewaters during EPA sampling at 10 sites show that these dioxin/furans were all detected at levels significantly (orders of magnitude) below the "Universal Treatment Standard" (40 CFR 268.48) level established under RCRA for dioxins/furans. In addition, low levels of HpCDD and OCDD (as indicated above) are generally considered pervasive in the environment and Universal Treatment Standards have not been set for these compounds. EPA identified no dioxin/furans in the Industrial Waste Combustor wastewater treated effluent.

CDD/CDFs are lipophilic and hydrophobic. As such, they are most often associated, or have an affinity for, suspended particulates in wastewater matrices. The more highly chlorinated isomers (i.e. the hepta- and octa- congeners) are the least volatile and more likely to be removed through particulate adsorption or filtration. While recommended treatment technologies differ according to the wastewater characteristics, there is some evidence that dioxins generally will bind with suspended solids and some sources (EPA RREL Treatability database) have asserted that these compounds may be removed by precipitation and filtration technologies.

Of the three week long sampling episodes conducted by EPA, the episode from which BAT/BPT limits were developed had no dioxins detected in the influent or effluent. At the other two facilities, HpCDD, HpCDF, OCDD, and OCDF were detected in the influent but none were detected in the effluent. Both facilities employed a combination of chemical precipitation and filtration that may have contributed to these removals.

The most toxic congener, 2,3,7,8- TCDD, was never detected in Industrial Waste Combustor scrubber water during the sampling program; and the CDD/CDFs detected were neither detected at most facilities sampled nor found in any significant quantity. The toxic equivalent (TEQ) values found in the Industrial Waste Combustor wastewater were low when compared to other dioxin sources in industry. The detected congeners were of the highly chlorinated type which may be treated by the methods recommended by this guideline (chemical precipitation, filtration). Also, since no dioxins were detected in the treated effluents at any of the three facilities EPA sampled, this may be evidence of dioxin removals.

Based on EPA's sampling program, no CDD/CDF met the criteria for wastewater regulation in the proposed rule.

The Agency has proposed CDD/CDF air emission limits of 0.2 ng/dscm from the stacks of hazardous waste burning incinerators (see 61 FR 17358 of 4/19/96 and 62 FR 24212 of 5/2/97), and believes that the incinerators have to operate with good combustion conditions to meet the proposed emission limits. In the final Land Disposal Restrictions (LDR) rulemaking that set treatment standards for CDD/CDF constituents in non-wastewater and wastewater from F032, the Agency has established (62 FR 26000, 5/12/97) incineration as the BDAT, after which the CDD/CDF constituents do not have to be analyzed in the effluent. EPA, therefore, considers that dioxins/furans will be

sufficiently destroyed given good combustion practices.

5.2.2 *Selection of Priority and Non-Conventional Pollutants for Regulation*

The priority and non-conventional pollutants proposed for regulation were determined by reviewing sampling data from the facility used for the proposed BPT/BAT technology. If a pollutant was not detected at all in the Sampling Program for the BPT/BAT facility, it was dropped from the analysis.

The initial pollutants of concern were the pollutants that were detected a minimum of three times in the BPT/BAT facility raw waste stream. EPA applied a minimum number of times (3) for detection as a rule of thumb so as to focus attention only on those pollutants likely to be present in wastewater at Industrial Waste Combustor facilities. Pollutants not detected at least three times were removed from the list of pollutants considered for regulation. Next, pollutants used as treatment chemicals and pollutants known to be nutrients in water were also removed from the list for further consideration. These pollutants are: ammonia as nitrogen, nitrate/nitrite, calcium, chloride, fluoride, phosphorus, potassium, silicon, sodium, sulfur, total phosphorus, and total sulfide. These pollutants are either added to the wastewater during treatment or are naturally present in the source water.

Additional pollutants were removed from the list of pollutants considered for regulation if the average of the influent concentrations (with non-detect values set at the detection limit) was below a treatable level in the BPT/BAT sampling episode. For most pollutants, the concentration was set at 10 times the method detection limit. For aluminum, the concentration was set at 5 times the method detection limit of 200ug/L because 200ug/L is a high method detection limit. Also, for lead, the concentration was set at 3 times the detection limit of 50ug/l due to the toxicity of lead in water. These pollutants are presented in Table 5-2.

Other pollutants were excluded from regulation because the technology option proposed was not effective in treating the pollutant. EPA applied the following test: if pollutant concentrations increase across the treatment system or the pollutant concentrations decrease by an insignificant amount, the pollutant was not considered effectively treated. These pollutants are listed in Table 5-3.

Table 5-2. Pollutants Excluded from Regulation Due to the Concentration Detected for the IWC Industry

Pollutants
BOD
Hexavalent Chromium
Barium
Cobalt
Lithium
Magnesium
Nickel
Strontium
Thallium
Vanadium
Bis(2-ethylhexyl)Phthalate
N-Hexacosane
N-Octacosane
N-Triacontane

Table 5-3. Pollutants Excluded from Regulation Due to Ineffective Treatment for the IWC Industry

Pollutants
Boron
Manganese
MCPP

Finally, pollutants were excluded from further consideration for regulation if they are indirectly controlled through regulation of other pollutants by the proposed regulations. These pollutants are listed in Table 5-4.

After evaluating all of these factors, the Agency selected 11 pollutants for regulation. The final list of pollutants to be regulated is presented in Table 5-5.

Table 5-4. Pollutants Indirectly Controlled Through Regulation of Other Pollutants

Pollutants
Aluminum
Antimony
Iron
Molybdenum
Selenium
Tin

Table 5-5. Pollutants Selected for Regulation for the IWC Industry

Pollutants
Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
pH
Silver
Titanium
Total Suspended Solids
Zinc

5.3 *SELECTION OF POLLUTANTS TO BE REGULATED FOR PSES AND PSNS*

Indirect dischargers in the IWC Industry send their wastewater streams to a POTW for further treatment, unlike direct dischargers, whose wastewater will receive no further treatment once it leaves their facility. Therefore, the levels of pollutants allowable in the wastewater of an indirect discharger are dependent upon: (1) whether a given pollutant "passes through" the POTW's treatment system or (2) whether additional treatment provided by the POTW will result in removal of the pollutant to a level equivalent to that obtained through treatment by a direct discharger.

5.3.1 *Pass-Through Analysis Approach*

To establish PSES, EPA must first determine which of the IWC Industry pollutants of concern (identified earlier in this section) pass-through, interfere with, or are incompatible with the operation of POTWs (including interferences with sludge disposal practices). EPA determines pollutant pass-through by comparing the percentage removed by POTWs with the percentage removed by direct dischargers using BPT/BAT technology. A pollutant "passes through" POTWs when the average percentage removed by well-operated POTWs nationwide (those meeting secondary treatment requirements) is less than the percentage removed by IWC direct dischargers complying with BPT/BAT limitations for a given pollutant. EPA has assumed, for the purposes of this analysis and based upon the data received, that the untreated wastewater at indirect discharge facilities is not significantly different from direct discharge facilities.

This approach to the definition of pass-through analysis satisfies two competing objectives set by Congress: (1) that standards for indirect dischargers be equivalent to standards for direct dischargers and (2) that the treatment capability and performance of the POTW be recognized and taken into account in regulating the discharge of pollutants from indirect dischargers. Rather than compare the mass or concentration of pollutants discharged by the POTW with the mass or concentration of pollutants discharged by a BAT facility, EPA compares the percentage of the pollutants removed by the facility with the POTW removal. EPA takes this approach because a comparison of mass or concentration of pollutants in a POTW effluent with pollutants in a BAT facility's effluent would not take into account the mass of pollutants discharged to the POTW from non-industrial sources, nor the dilution of the pollutants in the POTW effluent to lower concentrations from the addition of large amounts of non-industrial wastewater.

5.3.2 *50-POTW Study Database*

For past effluent guidelines, a study of 50 well-operated POTWs was used for the pass-through analysis. This study is referred to as the "The Fate of Priority Pollutants in Publicly Owned Treatment Works", September 1982 [EPA 440/1-82/303]. Because the data collected for evaluating POTW removals included influent levels of pollutants that were close to the detection limit, the

POTW data were edited to eliminate influent levels less than 10 times the minimum level and the corresponding effluent values, except in the cases where none of the influent concentrations exceeded 10 times the minimum level. In the latter case, where no influent data exceeded 10 times the minimum level, the data were edited to eliminate influent values less than 5 times the minimum level. Further, where no influent data exceeded 5 times the minimum level, the data were edited to eliminate influent values less than 20 µg/l and the corresponding effluent values. These editing rules were used to allow for the possibility that low POTW removal simply reflected the low influent levels.

EPA then averaged the remaining influent data and also averaged the remaining effluent data from the 50-POTW database. The percent removals achieved for each pollutant was determined from these averaged influent and effluent levels. This percent removal was then compared to the percent removal for the BAT option treatment technology.

5.3.3 *RREL Treatability Database*

Due to the large number of pollutants considered for this industry, additional data from the EPA Risk Reduction Engineering Laboratory (RREL) Treatability Database were used to supplement the 50-POTW Study data. (The EPA Risk Reduction Engineering Laboratory is now called the National Risk Management Research Laboratory (NRMRL). The editing rules used for the POTW database needed to be modified due to the organization of the RREL database.

For each of the pollutants of concern not found in the 50-POTW database, data from the liquid waste portions of the RREL Treatability Database were obtained. These files were edited so that only treatment technology data for activated sludge (including secondary clarification), aerobic lagoons, and activated sludge (including secondary clarification) with filtration were used. These technologies are representative of typical POTW secondary treatment options. The files were further edited to include only information pertaining to domestic or industrial wastewater, unless only other types of wastewater data were available. Only full-scale or pilot-scale data were used; bench-scale data were edited out. Only data from a paper in a peer-reviewed journal or government report or database were retained; all lesser-quality references were not used. Additionally, the retained references were reviewed and non-applicable study data were accordingly eliminated. Because the database is organized into groupings of influent values, the influent editing rules used for the 50-

POTW Study database could not be applied here. From the remaining pollutant removal data, the average percent removal for each pollutant was calculated.

5.3.4 *Final POTW Data Editing*

For each pollutant, the edited percent removals from the 50-POTW Study and RREL Treatability Database were compared. The final percent removal for each pollutant was selected based on a data hierarchy, which was related to the quality of the data source. This hierarchy was:

1. 50-POTW Study Data (10x NOMDL edit)
2. 50-POTW Study Data (5x NOMDL edit)
3. 50-POTW Study Data (20ug/l edit)
4. RREL Treatability Data (domestic wastewater only edit)
5. RREL Treatability Data (domestic and industrial wastewater edit).

The final POTW removals for the IWC Industry pollutants, determined via the data use hierarchy, are presented in Table 5-6.

Table 5-6. Final POTW Removals for IWC Industry Pollutants

Pollutant	CAS Number	Removal Percent	Source of Data
Arsenic	7440382	66	50-POTW - (20ug/l edit)
Cadmium	7440439	90	50-POTW - (10x NOMDL edit)
Chromium	7440473	82	50-POTW - (10x NOMDL edit)
Copper	7440508	90	50-POTW - (10x NOMDL edit)
Lead	7439921	85	50-POTW - (10x NOMDL edit)
Mercury	7439976	90	50-POTW - (10x NOMDL edit)
Silver	7440224	59	50-POTW - (20ug/l edit)
Titanium	7440326	79	RREL - (domestic wastewater edit)
Zinc	7440666	81	50-POTW - (10x NOMDL edit)

5.3.5 *Final Pass-Through Analysis Results*

For each IWC pollutant in each option, the daily removals were calculated using the BPT/BAT data. Then, the average overall BPT/BAT removal was calculated for each pollutant from the daily removals. The averaging of daily removals is appropriate for this industry as BPT/BAT treatment technologies typically have retention times of less than one day. For the final pass-through analysis, the final POTW removal data determined for each IWC pollutant was compared to the percent removal achieved for that pollutant using the BPT/BAT option treatment technologies. Of the nine pollutants regulated under BPT/BAT, all were found to pass through for Regulatory Options A and B and are proposed for PSES. The final pass through analysis results for the IWC Options are presented in Table 5-7.

Table 5-7. Final Pass-Through Results for IWC Industry Options A and B

Pollutant	Option Removal (Percent)		POTW Removal (Percent)	Final Pass-Through	
	A	B		A	B
Arsenic	99	98	66	YES	YES
Cadmium	94	98	90	YES	YES
Chromium	95	95	82	YES	YES
Copper	99	99	90	YES	YES
Lead	99	99	85	YES	YES
Mercury	91	97	90	YES	YES
Silver	91	98	59	YES	YES
Titanium	99	99	79	YES	YES
Zinc	99	99	81	YES	YES